

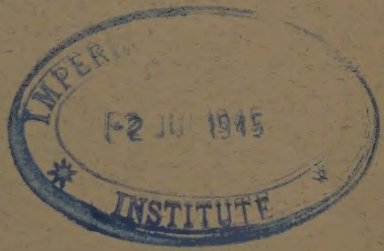
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THE BASIDIAL AND OIDIAL FRUIT-BODIES  
OF DACRYOMYCES DELIQUESCENTS

BY

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## THE BASIDIAL AND OIDIAL FRUIT-BODIES OF DACRYOMYCES DELIQUESCENS.

By Professor A. H. R. Buller, D.Sc., Ph.D., F.R.S.C.

*Dacryomyces deliquescens* is a very common fungus in England and appears during wet weather upon the surface of dead wood, such as old logs, rails, garden seats, gate-posts, etc.; but it was imperfectly described by the older systematists and by Massee, and its true nature is still misunderstood by many field mycologists. Tulasne\* studied its life-history and made the discovery (since confirmed by Brefeld†) that it produces two kinds of fruit-bodies which can be readily distinguished with the naked eye owing to colour differences: (1) orange fruit-bodies, and (2) pale yellow fruit-bodies. Both are gelatinous. The orange fruit-bodies produce oidia and the yellow fruit-bodies basidiospores. The orange fruit-bodies were originally described as *Dacryomyces stillatus* Nees and the yellow fruit-bodies as *Dacryomyces deliquescens* Duby; and this erroneous division of one species into two is still generally retained in systematic hand-books. To clear up the confusion which has thus arisen, I shall now re-describe *Dacryomyces deliquescens* from my own observations.

The orange fruit-bodies are small, rounded or hemispherical, 1-4 mm. in diameter and 1-2 mm. high, occurring in groups of more or less isolated individuals in lines along the grain of the woody substratum and often on its upper side so that they attract the eye. The yellow fruit-bodies are about the same size as the red ones, rounded, hemispherical or discoid, often somewhat wrinkled into folds at the surface especially where two or more fruit-bodies have anastomosed during development, and occurring like the red fruit-bodies in groups of more or less isolated individuals in lines along the grain of the woody substratum and often on its upper surface. In dry weather both the orange and the pale yellow fruit-bodies shrink very greatly, owing to loss of water, and become quite inconspicuous and difficult to find. When rain comes again, the fruit-bodies rapidly absorb water by imbibition and regain their former size and colour. There are few other fruit-bodies so dependent on atmospheric conditions as these.

In nature, the orange fruit-bodies often appear on the surface of wood in groups by themselves. The yellow fruit-bodies also

\* L. R. Tulasne, Observations sur l'organisation des Trémellinées, Ann. des sci. nat., Bot., t. XIX, 1853, p. 211.

† O. Brefeld, Untersuchungen, Leipzig, 1888, pp. 141-152.

often appear on the surface of wood in groups by themselves. Sometimes, however, patches of red and patches of yellow fruit-bodies appear near to one another on the same piece of wood but not intermingled; and, finally, sometimes red and yellow fruit-bodies appear on wood intermingled promiscuously. According to Tulasne, yellow fruit-bodies may be found, which have red spots upon them or which are gradually changing into red fruit-bodies\*. The reason for these variations in the distribution of the two kinds of fruit-body under natural conditions is not yet understood, but the production of one kind of fruit-body rather than another doubtless depends on the physiological condition—possibly the nuclear state—of the underlying mycelium†.

An orange fruit-body has a gelatinous matrix derived from the swollen outer confluent hyphal walls, and this matrix, while firm toward its centre, is more and more readily deliquescent in wet weather as one passes toward its periphery. A fruit-body consists of two parts—an inner, firmer, paler core attached to the substratum, and an outer, more softly gelatinous, thick, bright orange, exterior coating. The core contains pale, thin, branched, anastomosing hyphae which run toward the periphery of the fruit-body and there thicken and give rise to branched chains of pale orange oidia. Thus the thick orange outer coating of the fruit-body comes to be made up of oidia which are embedded in very soft jelly, and its colour is entirely due to the colour of the oidia. The oidia consist of one or two cells and show all stages of detachment from one another. Those on the very exterior of the fruit-body sometimes produce tiny conidia which project into the air. When rain comes, the outer part of the orange oidial zone deliquesces, i.e. the jelly absorbs so much water that it becomes liquid and flows. Thus during rain a large number of the outer oidia are washed away from the fruit-body and become dispersed. However, the production of oidia by the hyphae of the core is long continued so that new oidia gradually take the place of those previously washed away. It thus appears that the orange fruit-bodies are specialised for producing oidia and do not as a rule give rise to any basidiospores.

A yellow fruit-body, like a red one, has a soft gelatinous matrix derived from the swollen outer confluent hyphal walls. This matrix contains and envelops slender, branching, anastomosing hyphae which, toward the periphery of the fruit-body, branch and re-branch to produce the basidia which make up the

\* L. R. Tulasne, *loc. cit.*, pp. 216–218, Pl. 13, fig. 2.

† Cf. P. A. Dangeard, *Mémoire sur la reproduction sexuelle des Basidiomycètes*, Le Botaniste, t. IV, 1895, pp. 136–143.



hymenium. Each basidium has a body which is slender and cylindrical and which develops at its apex two stout divergent arms or sterigmata, the tips of which come to penetrate through the surface of the gelatinous matrix. Each sterigma produces at its free tip a single, elongated, curved spore which is provided with a well-marked hilum. The time taken for a spore to develop from a just recognisable rudiment to full size is only about 23 minutes. After a further 27 minutes the spore is discharged. Thus about 50 minutes only are taken up in the development, ripening, and discharge of each spore. There can be little doubt that this rapid rate of coming to maturity for each individual spore is a factor in assisting a revived fruit-body in rapidly resuming its spore-discharging function after rain. The drop excreted at the hilum begins to appear about 16 seconds before the spore is discharged, grows until it attains the diameter of the spore, and is then carried away by the spore when this is shot from its sterigma. A spore can be shot out from its sterigma 0.5–0.65 mm., so that although the hymenium often looks upwards, the wind has an opportunity of carrying away the spores before they can fall back on the hymenium.

Massee\*, in his "British Fungus-Flora," describes the yellow fruit-bodies of *Dacryomyces deliquescens* as follows:

"*Dacryomyces deliquescens* Duby.

Gelatinous, rounded or irregular, convex, gyrose, yellow, hyaline, basal portion root-like and entering the matrix, spores cylindrical, obtuse, curved, 3-septate,  $15-17 \times 6-7 \mu$ .

*Dacryomyces deliquescens*. Duby, Bot. Gall., p. 729; Cke., Hdbk., p. 351.

On pine-wood. In perfection during the winter months. Forming yellow subcircular convex masses 1–4 lines broad, often growing in long lines out of cracks in the wood."

Massee's statement that the spores are 3-septate is misleading. The fact is that the spores, when on their sterigmata and immediately after discharge, are *unicellular* just like those of other Tremellineae, and only become 3-septate and 4-celled when lying in water and preparing to germinate. The spores of several other Tremellineae behave similarly†.

Massee says that the fruit-bodies occur on pine-wood. That is true, but my experience is that they occur on various kinds

\* G. Massee, British Fungus-Flora, London, 1892, vol. 1, p. 67.

† In his illustration of a basidium of *Dacryopsis nuda* Mass. in his British Fungus-Flora (vol. 1, p. 56), Massee represents the spores on the sterigmata as 3-septate and 4-celled. It is not unlikely that this is an error and that the spores on the sterigmata should have been represented as unicellular. Massee may have found isolated spores lying on the hymenium which had become 3-septate after discharge and have then supposed that they were 3-septate before discharge.

of wood both hard and soft, but especially on coniferous woods. Massee says that the fruit-bodies are 1-4 lines wide. These measurements seem to me a little too large. As Massee says, the fruit-bodies are yellow. However, I find that the fruit-bodies most exposed to the light are the yellowest, and that those which grow under logs and boards and in other very dark situations are relatively very pale yellow and sometimes almost colourless.

Massee\*, in his "British Fungus-Flora," describes the red fruit-bodies of *Dacryomyces deliquescens* as follows:

"*Dacryomyces stillatus* Nees.

Gelatinous, rounded, convex, more or less plicate, persistently orange; spores cylindrical, curved, and multiseptate,  $18-22 \times 7-8 \mu$ .

*Dacryomyces stillatus*. Nees, Syst., p. 89, f. 90; Cke., Hdbk., p. 352.

On pine and other decaying wood. Distinguished from *D. deliquescens* by its rather small size, firmer substance, deeper orange colour, and larger, multiseptate spores. Usually barren."

Massee describes these red fruit-bodies as being more or less plicate. My experience is that they are mostly hemispherical and irregularly humped or obtusely tuberculate rather than plicate. He also says: "spores cylindrical, curved, multiseptate,  $18-22 \times 7-8 \mu$ ," but he fails to tell his readers that by 'spores' he means not basidiospores, but *oidia* embedded in the gelatinous outer layer of the fruit-body. Each *oidium* has at least one septum across it, but the *oidia* hang together in chains and show all stages of separation from one another. Only the chains of *oidia* are multiseptate. The width of the *oidia* I find to be  $2-4 \mu$  and not  $7-8 \mu$ . They are but rarely as wide as the basidiospores. The 2-celled *oidia* are  $12-15 \mu$  long, but chains of these *oidia* imperfectly separated from one another may be  $45 \mu$  or even  $60 \mu$  long. The *oidia* are usually curved or undulate and are sometimes more or less Y-shaped. In each cell there are usually two small central rounded bright spots, so that the chains of cells are guttulate. The *oidia* on the exterior of the fruit-body produce a few tiny oval conidia about  $2 \mu$  long. If a red fruit-body be touched into a drop of water on a slide, some of these conidia can usually be found in the drop among the *oidia*, and occasionally one may find them attached to their *oidia*. Massee says that the fruit-bodies are "usually barren." Exactly what is meant by this is not clear. As a matter of fact the red fruit-bodies always produce a crop of *oidia* and never any basidiospores.

\* G. Massee, *loc. cit.*, p. 67.



A brief description of *Dacryomyces deliquescens*, suited for systematic purposes, is as follows:

*Dacryomyces deliquescens* Duby.

Synonym for the oidial stage: *Dacryomyces stillatus* Nees.

*Basidial fruit-body*—gelatinous, convex, rounded, or irregular when confluent, often slightly plicate or gyrose, yellow, translucent, 1–6 mm. in diameter, basal portion emerging from the wood at the central point. Basidiospores cylindrical, curved, obtuse,  $12-15 \times 5-6 \mu$ , 1-celled when discharged from the sterigmata but after lying in water soon becoming triseptate and 4-celled.

*Oidial fruit-body*—gelatinous, convex, mostly hemispherical, not plicate but when large often irregularly humped up at the surface, bright orange, rather opaque, 1–3 mm. in diameter, basal portion as before. Basidiospores never present. Oidia very numerous, embedded in the outer gelatinous layer which deliquesces in rainy weather and sets them free, formed in branching chains, cylindrical, curved or flexuose, sometimes forked, usually 2-celled but forming chains owing to imperfect separation, width  $2-4 \mu$ , length when 2-celled  $12-15 \mu$ , but forming chains up to  $60 \mu$  long, sometimes bearing one or two minute oval conidia  $2 \mu$  long, contents pale orange with one or two clear guttules in each cell.

Lignicolous, occurring on many different kinds of wood especially coniferous woods. Common everywhere, often seen in gardens on old pine boards, wooden rails, harbour-work, etc. It is to be found all the year round but is conspicuous only in wet weather.

The two forms of fruit-bodies were originally described by Duby and Nees as independent species and have always been so treated by systematists, the basidial form being called *Dacryomyces deliquescens* and the oidial form *D. stillatus*; but Brefeld has proved that they are nothing but two stages of the same species. They may be found separated from one another on different substrata, or in separate patches side by side on the same substratum, or occasionally intermingled. According to Tulasne some of the yellow fruit-bodies may at times be marked with red patches of the same nature as the red fruit-bodies.











